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SOIL CONSERVATION

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Their future depends on maximum production today, with the land safeguarded for continuing production.

MORE FOOD WITH SOIL CONSERVATION

BY H. H. BENNETT, CHIEF, SOIL CONSERVATION SERVICE

RIGHT on the heels of the all-time production record of 1942, the farm lands of America are called on to produce still more food and other war crops in 1943.

As the war goes on our productive lands will be required to produce more and more food, fiber, and vegetable oils for military and civilian purposes. Because it is one of the first weapons of war—and the first essential of all human activities in peace or war—food must be produced in increasing abundance, year after year, so long as the struggle continues. And after the war when the supplications of hungry people throughout the world fall upon the ears of those peoples who can still produce, requirements for food may surpass all present calculations.

Few people bother about the meaning of these mounting demands on our basic resource: "That's the farmers' problem," they will say.

Actually, it is a problem affecting all of us. There is not much more good soil to plow up; we've put most of it into use. This means near-scarcity right at the base level—at a time when the soil must keep on producing at top capacity, regardless of deficiencies of fertilizers and farm machinery and shortages of manpower and transportation.

If you keep on taking food out of the larder without putting any back, eventually there will be shortages and difficulties in the dining room. It is the same with productive soil. In the circumstances there is one inevitable question: How can our lands continue producing what is required of them?

Do enough of us know the answer?

In some degree, perhaps. Good weather, long hours of hard work by farmers, and efficient distribution of farm products make up part—but only part—of the answer as to how our limited supply of land can keep on meeting the increasing demands for high production of a long list of the utter essentials of war and peace.

In the last analysis, the only way the difficult task can possibly be solved is through soil conservation. So that this may be clearly understood, let us define soil conservation in its modern concept.

Soil conservation means the kind of use and treatment of land which matches the capabilities and meets the needs of the land, so that the soil may be safeguarded and kept productive under continuing intensive cultivation—intensive cultivation for the period of the war. This means not only that the soil and its content of plant nutrients and beneficial micro-organisms must be conserved, but that rainfall must be stored for plant growth in dry seasons and the favorable tilth of the soil maintained with appropriate measures.

Moreover, soil conservation means saving soil, not just to keep the landscape in order, but to keep the land in sound health for continuing productive use.

To accomplish these imperative ends, land must be treated with adequate measures to maintain its full productivity. According to the land's adaptability and needs, soil-building crops must be substituted and rotated at the right time and place to make up for any deficiencies resulting from the growing of soil-depleting crops; the land must be contoured, strip-cropped, and terraced as conditions demand.

Land that is too steep to be plowed must be planted in grass, perennial legumes, shrubs, trees, or whatever plants our experience may show us it is best fitted to grow. If good soil is too thickly strewn with rocks for plowing, the rocks must be removed. If fertile land is unproductive because of too much water, artificial drainage must be provided. If, by drainage, good flat land can be substituted for adjacent erodible hill land, or for other unsuitable land by irrigation, then good soil conservation practice requires the use of these methods of reclamation.

The two sacks tell the difference in yields between contoured and noncontoured corn fields of Nick Claussen, Nebraska farmer. Left, 30 bushels corn to the acre produced with contouring; right, 20 bushels without contouring.

If sufficient nitrogenous fertilizer is not available, the nitrogen-supplying legumes must be grown; and animal manures, and leaves and straw must be saved for replenishing the supply of organic matter in the soil or for mulching the land.

Other things—other practical measures and treatments—will be called for to meet the requirements of the soil for permanency. Across the Nation's multiplicity of topographic conditions and climatic pockets and zones, these measures and practices will need to be varied in a hundred ways to fit the varied local situations.

SOIL CONSERVATION INCREASES YIELDS

Many of the same measures that maintain the soil also increase per-acre yields. Fortunately, some of the increase usually comes the first year.

Every now and then some appraiser of the value of soil conservation tells us that "soil conservation is all right provided farmers can stand the financial strain long enough for the benefits to show up in increased yields." The implication that the crop-increasing effects take a long time to show up is incorrect. In most instances increased yields come almost immediately. Conservation farming, after all, means simply that the operator makes certain readjustments in his farming practices, or installs practical devices, so that what he does fits the kinds of land he has and helps to keep the soil in good health and to prevent it, along with the fertilizers, manures, and seed that he puts into the ground, from washing down the creeks.

Thousands of measurements of practical conservation farming results have been made. The prevailing facts are known; there are no longer any "ifs" about it. For example, look at the findings of the Department of Agricultural Economics of the University of Illinois:

In four important farming counties in Illinois, 90 of 121 farms studied produced more per acre of corn, soybeans, and oats, respectively, when the crop was grown on the contour than when it was grown in the old way, up-and-down the slope. On a 3-year average, contoured corn produced 7.7 bushels more per acre than noncoutoured corn; soybeans grown on the level outproduced beans grown off the contour by 3.3 bushels per acre; and contoured oats beat the other kind by 10.2 bushels. On land

of Class II capability—the majority of the fields compared were of this class—contour farming beat the old-style up-and-downhill farming by 9.6 bushels of corn, 5.9 bushels of soybeans, and 12.9 bushels of oats per acre.

The effect of contouring on corn production has shown an average increase of 11.3 bushels per acre, as measured in 1941 on 19 representative farms in the rolling sections of Iowa. In 1940 the corn acreage for the 5 principal corn States was 27,715,000 acres. If but half the increased yield resulting from contouring in Iowa in 1941 were obtained on half the corn acreage of the 5 States, the increased production would amount to 77,602,000 bushels—enough to produce 3,880,100 porkers weighing 200 pounds each.

As the result of the work carried out by the CCC drainage camps, such as cleaning silt out of drainage ditches and removing obstructing growths of brush, 13 million acres of land were brought back into production or improved in producing capacity. Some of these reclaimed and benefited lands stretch far back from the ditches along which the conservation-drainage work was done, and for this reason the results have not been adequately appraised. Anyone who misses the point of how this single item of conservation work is helping win this war, might miss also the larger point of how the great Nation-wide soil-conservation program is making a war contribution of nothing less than staggering proportions.

SOIL CONSERVATION INCREASES INCOME

By increasing acreage yields and encouraging diversification of crops, soil conservation leads farmers to eliminate some of the hazards of single-crop farming, increases income, and provides more of the necessities of a balanced, live-at-home agricultural enterprise.

Let us have a look at what conservation has done for some typical North Carolina farms in counties covering various types of farming, by examining the estimates of the farmers, themselves. These results pertain to the effects of conservation in 7 soil conservation districts, covering 28 important agricultural counties.

On 281 farms soil conservation has given the following increases in per-acre yields: Corn 43 percent, oats 32 percent, wheat 31 percent. On 249 farms in the tobacco section, the average increase was 32 percent; while on 28 farms in the peanut area the average increase was 31 percent. Cotton has shown an increased yield of 37 percent on 242 of the farms cited.

Philip Soucia, Maine farmer, can supply many an Army mess because he grows potatoes in strips laid on contour.

Pasture for grazing has been increased more than eight times on 240 farms, and production of hay has more than doubled on 243 farms. Production of home-grown seed, mainly of soil-improving legumes, has jumped up four times on 100 of the farms, and the growing of kudzu has increased by four times on 98 farms.

Numbers of cattle raised on all the farms has increased by 146 percent and hogs 68 percent. Increased poultry production has amounted to 83 percent on 237 farms.

The average annual increase in per farm income from new crops, livestock, and other outgrowths of the conservation program amounted to $448 on 214 farms. Thus, in addition to permanent benefits to the land resulting from control of erosion and other aspects of good land use, the average annual increased income from these farms has amounted to $95,832.

The achievement of A. L. Holeyfield, White County, Ark., is fairly representative of what has been done on thousands of farms. It is a good illustration of what can be done by a great many farmers right where they are, through sound conservation farming:

In 1935 you could drive a team up and down the

gullies on the Holeyfield farm. The soil was so badly depleted that it was practically impossible to make a satisfactory living on the place. There was a mortgage on the farm, but the land was of such little value it was not foreclosed. Twenty-five acres of cotton were producing only 4 bales. More grain was needed, more corn, more pasture, more income. Cash income amounted to approximately $200 a year.

Mr. Holeyfield finally took to conservation farming, and now has plenty of grain and good pasture for his livestock. Gullies have been filled in and substantial terraces run across them. In 1941, 16 acres of cotton produced 10 bales; and cash income was $1,250. Not only has this conservation farmer worked out his own problems, but he has been persistent in his efforts to encourage his neighbors to carry out similar practices. Today, there are only two farms in his community that have not instituted soil-conservation programs on their land.

In the early 1930's, P. A. Dooley of Cave Spring, Ga., was growing nothing much but cotton and corn on his 700-acre farm. Cotton was virtually the only source of cash income; it was planted on the best parts of the farm year after year. Erosion was a serious problem, but there were no terraces, no protective cover crops, no soil-improving rotations, and crop rows were not on the contour. Cotton yields averaged less than half a bale per acre.

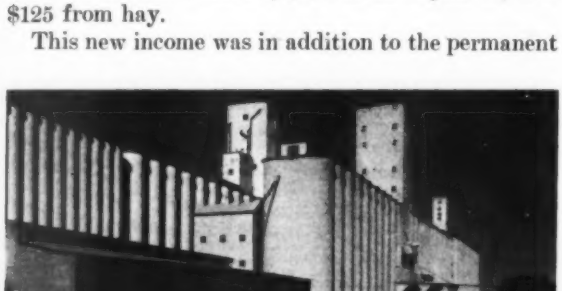
Mr. Dooley knew something was wrong but couldn't "put his finger on the trouble." He joined up with the local erosion-control program in 1936. Benefits began to accrue at once. In 1942 his cash returns from increased yields and crops not previously grown amounted to $5,487. His cotton yields jumped from 60 bales on 130 acres to 84 bales on 116 acres, and this brought in an extra $2,200. There was $850 more from 1,300 bushels of wheat and oats—crops not previously grown—and $300 from kudzu hay, $1,710 from 10,500 pounds of lespedeza seed of several varieties, $222 from soybeans, and $125 from hay.

This new income was in addition to the permanent improvement of the land through soil conservation, together with an improvement of the woodlands and an increase in livestock. Mr. Dooley summarized the situation as follows: "The soil-conservation program has saved me from bankruptcy and my farm from destruction. Farming is now a pleasure; before it was just plain drudgery."

In New England, too, come quick dividends from conservation. R. N. Johnson, who farms near Walpole, N. H., several years ago decided that his potato farm was suffering from the effects of straight-row, up-and-down-the-slope cultivation. To operate on the contour, he removed a number of old stone fences. Then he swung his crop rows right across the slopes in alternating bands—ten rows of potatoes, then a protective strip of hay, then ten more rows of potatoes. Some of those hay strips stretched out 1,700 feet or more. To take care of excess water, he installed more than 30,000 feet of terraces and diversion ditches, and nearly 2,500 feet of vegetative outlets. All that cost money, about $1,800.

But the returns from the investment were immediate, continuing—and convincing. Recently when members of the American Society of Agronomy, holding a regional session in Durham, visited the Johnson place, they found an enterprise built for permanent high production. Mr. Johnson, like any good business man, knew exactly where he stood. He had paid the cost of capital outlay for conservation improvements out of increased yields alone. In one year, 1939, he had dug 483 bushels per acre, 76 bushels more per acre than in his best previous year. This increased yield amounting to 4,332 bushels from 57 acres in one year was enough to pay for every terrace, every outlet, every shift of fences, every single item of conservation expense.

Asked by one of the visiting agronomists, "What would it have cost you if you had not carried out this soil-conservation work?" Mr. Johnson quickly replied, "I would have lost my farm in not more than 5 years. I might have continued farming but it would have been at the direction of the bank."



Full elevators are signal flares of victory at home. Conservation helps fill these bins.

NOW WE HAVE A PROGRAM

When World War I struck, comparatively few knew anything about soil erosion. There was no general concern over the problem and no national program for safeguarding productive lands from the blight of erosion, or for using them according to capability. So, 25 years ago, when farmers were asked to adjust food production to war needs, we were not prepared for any such emergency call.

We produced the food, but we mistreated the land terribly. It was a veritable Belshazzar Feast in the

Strip cropping and diversion terraces are a trade-mark of sound production principles on these steep slopes. This is one of the numerous spots in rural West Virginia where war needs are obviously being taken seriously.

use of land. Old-field pine was cleared from thousands of hillsides in the Cotton Belt that were too steep for cultivation in the first place; countless pastures were plowed up across the Nation and millions of acres of grassland broken out for wheat and corn. It was probably the largest and most disorderly plow-up in history.

As a matter of fact, the modern method of classifying land according to its capability was not even invented at that time. This, together with such other basic deficiencies in preparedness as lack of a national program for conservation of soil and water, led us on to the orgy. Millions of acres were plowed that should never have been plowed.

The harvest from that staggering error in land use brought a multitude of evil things: Millions on millions of wasting gullies; prodigious quantities of soil flying the high pathways of the winds as dust storms; millions of acres impoverished or ruined; armies of migrating farmers, and a host of complications and difficulties erupting out of that chaos of land misuse that was so unnecessary.

In attempts to alleviate the problems that had their origin partly or entirely in that blunder, we spent in one way or another more than a billion dollars. And the scars of wounded earth have not all been healed.

Pearl Harbor found America on guard—out on the farmlands of the Nation. Much had been learned from our errors. The gods of the elements had not for nothing blotted out sunlight over the Nation's capital with rich soil from the Plains. We *did have a program* this time for wisely using and safeguarding our capital stock of productive soil. We had well under way the largest, most meaningful and effective program of sound land use in historical time. Farmers understand this program much better than city folk, some of whom haven't realized that their welfare, also, is fundamentally dependent upon the welfare of the land.

FARMERS WORKING TOGETHER

The soil-conservation districts movement represents, I think, one of the most significant developments in land use that farm people have ever adopted. Thoroughly democratic in spirit, purpose, and procedure, the districts are now functioning to the very great advantage of our Nation at war. They have now spread to 42 States—821 of them, comprising 478 million acres—and in a number of ways they are aiding the agricultural part of the program of increased production for war.

Established and directed by the farmers themselves, the districts are making effective use of the cooperative inclinations of human beings. This working together among farmers is proving far more productive than any one had foreseen. It is helping to meet some of the difficulties created by

war demands on labor supply and on the technical personnel of the Service.

Here are some of the ways soil-conservation districts are helping win the war:

District supervisors, sensing the need for making use of every ounce of farmer energy and initiative, have swung into increased action throughout the land. An outstanding contribution by the districts arises out of the splendid accomplishments of small community groups headed by leaders selected by group members and district supervisors. These groups, usually composed of 10 or a dozen farmers, up to 30 or more, living in a compact locality or a well-defined watershed, have pushed ahead with their cooperative conservation work and other farm activities in a way that seems to deny the existence of insurmountable obstacles. They are helping one another to the utmost in getting the conservation job, and all farm jobs, done on time. They come together in schoolhouses, barns, farm kitchens, anywhere to discuss their problems, both individual and common.

Together, they make provisional conservation farm plans for their own farms and help their neighbors work out appropriate arrangements for their farms; and often do excellent jobs. In this way various phases of conservation work are getting under way without loss of time, while awaiting the assistance of an engineer or crop specialist.

Working together, community farmers give one another such moral support as is sometimes needed to encourage the adoption of new ideas, whether it be contour farming or converting a steep cornfield into pasture. In this way farmers work out really amazing plans for pooling their resources of equipment, power, and labor. Sometimes half a dozen operators, or more, will be working on another man's farm at the same time, in order to do on all the farms the things that could not be so efficiently done if they worked alone on only their own land.

Thus, through the combined increased efforts of hundreds of thousands of farmers and ranchers, a mighty blow has been struck at Hitler, Hirohito, and their fellow conspirators against civilization.

In many other ways the districts are helping. And various agencies are assisting the districts as well as one another. These aids, together with every possible aid in every specialized field of agriculture, are keeping conservation going ahead. And that is essential.

BROTHERHOOD OF THE SOIL

It should never be overlooked that work on land to keep it productive makes it possible for human beings to enjoy, lastingly, the fruits and benefits of this basic resource, and brings people together perhaps more than any other cooperative endeavor. This is my observation from working across the years with various groups here in the United States, in Mexico, South America, and other places. I am convinced that in the struggle for adequate food—the thing for which man will fight, and die for in a pinch, quicker than anything else—there is opportunity for men working together throughout the world to come to better understandings. If land everywhere can be made to produce more with conservation treatment—and there is every reason to believe that generally it can be—one of the principal causes for discontent will have been removed or improved.

By such action, carried to the ends of the world eventually, one of the basic causes of international strife might be eliminated—through more productive land for food and raiment. Certain it is, other approaches to the proposal of ending wars have led us, 1,943 years after the birth of Christ, into the most nearly global of all the long bloody lists of wars, and the one that potentially could come nearest to blasting civilization off the earth.

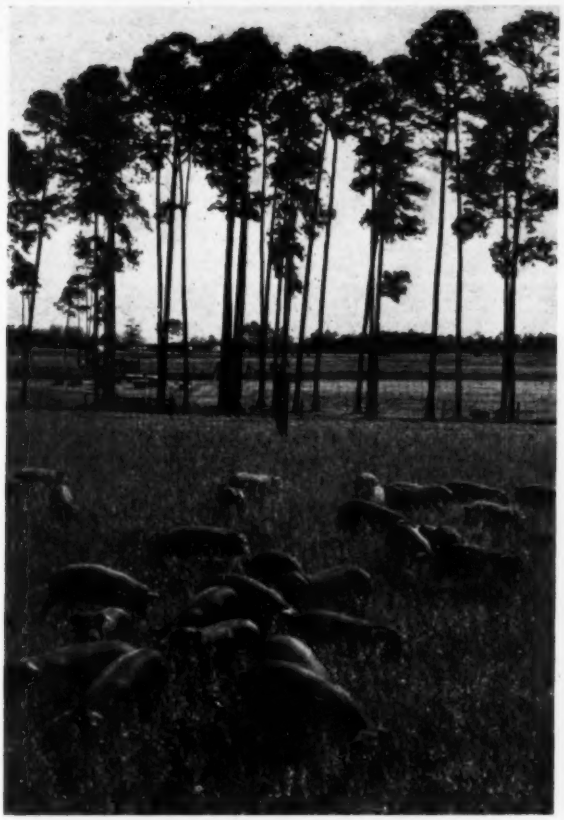
Well-fed people, living contentedly on well-tended land, are not so likely to be swept off their feet with a lot of hokum about superior races and natural spheres of influence; nor will they be led so easily into wars of aggression.

It must be remembered always that no matter how strongly constructed are our farm buildings, or how well farms may be equipped with the advantages of electricity and machinery, if the soil is permitted to wash away, all of us will have lost our sustaining capital—the source of food and life. We can replace buildings and machinery and electric lines, but we cannot replace productive land.

Moreover, the fact must not be overlooked that the world's supply of good farm land is shrinking, not increasing. It is imperative that the march of soil-impoverishing erosion be halted. The problem is at once individual and national in most agricultural countries; it becomes international in the aspects of good neighbor relations and the brotherhood of the soil.

I believe it to be the privilege and duty of the people of the United States to help the people to the South of us and the people to the West of us across the Pacific to improve their soil; therefore to increase their food supply and the quality of human living. During the war, this kind of help will be needed to increase food production and thereby add to the endurance of our fighting forces. When the war comes to an end I believe this help on the part of the United States can be furnished at a very small cost, as compared to the returns in human happiness to all concerned.

—HENRY A. WALLACE,
Vice President of the United States.



Porkers harvest oats, effect savings in labor and machinery costs.

CONSERVATION AT WORK

BY R. E. UHLAND[1]

IT IS ASSUMED that for the duration of the war the United States will supply substantial quantities of food to Britain, Russia, China, and other nations that break away from Nazi and Japanese domination. Our own military and naval forces will need increasing quantities of food now that the war has spread around the globe. It seems probable that the post-war rehabilitation period will require even greater food stocks of milk, meats, oil crops, eggs, vegetables high in food value, and other essential products for a number of years. This urgent need for more feed and food products to help meet war needs demands that our past methods of handling agricultural land be improved.

The fertility of all cropland, both level and sloping, must be maintained if production goals are to be met. It is only in comparatively recent years that soil conservation has been appreciated as a means not only of preserving cropland and grazing land but also of obtaining better production from these lands. Research findings now show that many soil conservation practices, including proper land use, can help increase the production of those crops required to meet war demands. There is no doubt now that conservation practices will result in immediate and continuing increases in crop yields.

On a cooperative farm near Bethany, Mo., badly eroded land that was limed, fertilized, and seeded to a clover-and-grass mixture produced abundant hay. This same land planted to corn after 3 years of meadow produced more grain per acre than adjacent fertilized land in third-year corn, although the latter was less steep and erosion was not as serious.

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Yield data on corn and soybeans, taken over a period of years in several of the principal Corn Belt States, show that, other factors being comparable, the per-acre yields of these crops were proportional to the depth of topsoil that remained. The loss of an inch of topsoil caused a lowering of the yield of corn from 3 to 8 bushels per acre. Measurements of soil losses at Bethany, Mo., revealed that during the period 1931–40 a plot 146 feet long with a slope of 7 percent lost 4.4 inches of soil by erosion. The lowered corn production associated with this loss of topsoil for 1942 was about 25 bushels per acre, or an amount sufficient to have produced 250 pounds of pork.

Although the use of lime, crop rotations, contouring, fertilizers, and manures markedly increased the yield of corn, these increases were limited by the amount of topsoil that remained. This emphasizes the necessity of initiating conservation farming while a good amount of topsoil remains. Although the yield data showed a close relationship between soil depth and yield in all fields, there were also striking contrasts in production levels as associated with management practices. The per-acre yields on those fields where proper use of land had been practiced and where soil amendments and simple conservation measures had been applied were much higher than on similar fields where little attention had been given to proper land use and conservation methods.

PRODUCTION IN THE CORN BELT

Production records for the Corn Belt show that we must depend upon more than increased crop-acreage to guarantee the added production necessary to the victory program. Lack of farm labor and equipment makes it impractical greatly to extend our crop acreage, even if sufficient additional acreages were available. For example, in 1940 the corn acreage of Ohio, Indiana, Illinois, Iowa and Missouri—the five principal Corn Belt States—was 22 percent below the 1928–32 acreage. The acreages of oats and barley were down about the same. Soybeans had expanded, however, to take up about half of this reduction with the other half shifted to hay and pasture, or idle.

Fortunately, in the Corn Belt increased yields of crops more than offset the decreases in acreages. Corn yields in four of the five States were 20 to 30 percent above the 1922–31, 10-year average. The production of all important crops for the period 1938–40 averaged 10 percent above 1928–32. Grain production, including soybeans, was 5 percent larger; hay production, 31 percent; and pasture, 14 percent.

These data show the opportunity and also the responsibility of farmers in the Corn Belt to help carry out the Nation's war production program. While part of this increased production may be secured by cultivating new acres, the major portion of it must come from land already being cropped. This demands more efficient use of the land we cultivate and, certainly, it implies *conservation farming*.

We must expect, of course, that the extent of increased production will vary widely because of the tremendous diversity in physical factors, operational skills, and multiple conservation practices reflecting their influence on yields. Nevertheless, experimental data collected throughout the Corn Belt region, together with extensive observations made under widely different conditions, indicate that in spite of these variations the level of crop yields for the region can be increased at least 25 percent.

One of the most difficult problems immediately ahead of Corn Belt farmers is that of fitting the large increase in soybean acreage into rotations without inciting serious erosion. Sloping lands when cropped to soybeans are subject to serious erosion and for this reason the crop should be grown on the more level lands. The use of conservation farming for greater production therefore must be approached on an individual farm basis.

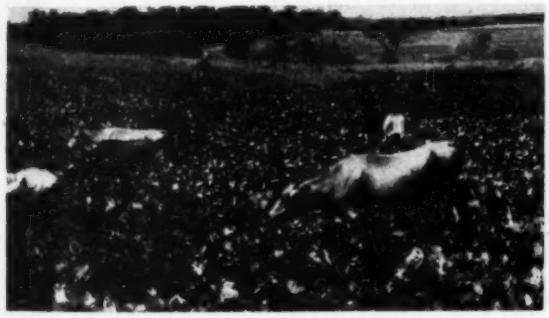
In general, total grain production can be increased by using cropping systems with a large proportion of higher-yielding crops on the more level fertile farms or fields, and by expanding the use of such conservation practices as liming, contouring, fertilizing and manuring on all farms. Furthermore, it has been shown that feed supplies can be made to go further in livestock feeding by giving more attention to feeding and sanitation practices. Land, labor, machinery and equipment are limited on most Corn Belt farms. Care must be taken, therefore, to see that each is used to the best advantage. In planning the activities for each farm the farmer must bear in mind that this increased demand for farm products will probably continue for a number of years.

According to *Agricultural Statistics*, in 1940 the average Corn Belt farm, in the five principal Corn Belt States, contained 129 acres with 66 acres devoted to cultivated crops and the remainder to pasture and timber, or idle. The acreages of different crops together with production for each farm in 1940 were as listed on page 179. The digestible nutrients were calculated for both the grain and forage.

Conservation farming on this average Corn Belt farm would call for a number of changes. In the first place the percent of the land in clean-tilled crops in 1940 was too large and did not provide for

Corn on the contour makes more corn on the cob.

Contour cultivation following a winter cover crop increases yield of lint and seed.



Kudzu is a great new triple-purpose crop. It stops erosion and rebuilds soil. It produces high quality hay. It supplies abundant pasture.

Hay makes meat and better farms.

essential crop rotation. The idle land was subject to active erosion and did not yield an income. Much of the pasture was weedy and was overgrazed because of lack of sufficient supplemental feed for livestock.

Crop	*Acres*	*Weight or quantity*	*Digestible nutrients, lbs.*
Corn	27. 1	1151.8 bu.	88, 169
Soybeans	3. 6	60.1 bu.	3, 463
Oats	12. 1	494.9 bu.	21, 561
Wheat	7. 2	161.5 bu.	12, 938
Hay	16. 0	21.4 tons	21, 440
Pasture lots and idle	48. 8	45.8 tons	45, 774
Timber	14. 2		
Total	129. 0		193, 345

Under the conservation plan of farming part of the corn and soybean acreage was shifted to idle or pasture land that was not subject to serious erosion. The crop acreages along with the production under the conservation system are shown below. The yields are calculated by assuming a 25-percent increase which according to experimental findings is a very conservative increase to expect.

Crop	*Acres*	*Weight or quantity*	*Digestible nutrients, lbs.*
Corn	21. 7	1152.3 bu.	88, 211
Soybeans	3. 6	75.2 bu.	4, 333
Oats	12. 7	636.3 bu.	27, 721
Wheat	7. 6	196.8 bu.	15, 773
Hay	20. 4	34.3 tons	34, 270
Pasture lots and idle	39. 8	46.8 tons	46, 800
Timber	14. 2		
Corn (new land)	5. 4	286.7 bu.	21, 951
Soybeans (new land)	3. 6	75.2 bu.	4, 334
Total	129. 0		243, 393

The added production of digestible nutrients on the average Corn Belt farm under the conservation plan of farming would amount to 50,084 pounds, or an increase of 25.9 percent. This additional supply of feed, if used to produce livestock, would be sufficient to keep four cows, four calves, and four heifers and to produce twelve 250-pound hogs. Under the conservation plan, all sloping land would be contoured; fertilizer, lime, and manure would be applied where needed; and all crop residues would be kept on the land. The acreage of clean-tilled crops would be increased only 3.6 acres per farm, and the land in rotated crops would be 9.1 percent greater than in 1940.

If conservation farming to the extent indicated above should be adopted by but one-half the farmers in these five Corn Belt States, the increased crop production, if used for growing additional livestock, would be sufficient to keep 2,202,380 cows

That terrible drought of '36 ruined the bluegrass but sweetclover carried on. Well-conditioned Herefords, assured of plenty of winter feed; a full silo; giant straw stacks attest the value of lusty legumes given a job to do.

averaging 1,000 pounds, 2,202,380 calves averaging 350 pounds, 2,202,380 heifers averaging 700 pounds, and 6,607,140 hogs averaging 250 pounds.

On 19 rolling farms in eastern Iowa in 1941 one or more uniform fields were divided into two parts; one part was planted to corn on the contour and the other part to the same crop not on the contour. Results of these tests showed that contouring alone increased the yield of corn 11.3 bushels per acre. The two parts of each field were treated identically in every other way. On the basis of these findings, the application of this simple conservation practice to one-half the corn land in these same Corn Belt States would produce sufficient additional corn for the livestock listed above, even if we assume the increase to be only about one-half of the recorded increase.

PRODUCTION IN THE COTTON SOUTH

Another area where farmers can further the food-production program is in the Cotton South. Census records show that half of the farm people of the United States live in 13 Southern States. In 1940 these southern farmers operated about one-third of the Nation's farm land and received only one-fourth of the cash farm income. Cotton has long been the crop that furnished the major cash income of the States of Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, and South Carolina. The marked increase in the urban population in these Southern States during the past 20 years is providing an expanding outlet for livestock and other food products.

Studies made of erosion in the South show that to control this terrible waste the percent of the land in clean-tilled crops must be materially reduced. Experimental results show that crop yields can be markedly increased by practicing a conservation type of farming which includes proper land use, contour cultivation, soil amendments, utilization of crop residues, etc. Results of 3 years of experimental study at Athens, Ga., show that the use of a winter cover crop on continuous cotton increased the yield of cotton 23.5 percent. Cotton grown in a 2-year rotation with oats and cowpeas increased in yield 52.4 percent, while in a 3-year rotation with 2 years of lespedeza this increase was 83.1 percent. These and other experimental results, supported by extensive observations throughout the South, indicate that it is conservative to assume that the yield of cotton and corn can be increased 40 percent; oats, wheat, and hay 50 percent; and tobacco and soybeans 25 percent by applying conservation measures.

In 1940 the average cotton farm in eight of the Southern States contained 91 acres with 36 acres devoted to cultivated crops and the remainder in timber, pasture, or idle. The acreages under the 1940 plan of farming, together with the crops and digestible nutrients produced, are shown below.

Crop	*Acres*	*Weight or quantity*	*Digestible nutrients, lbs.*
Cotton lint	------	2,605.9 lb.	Sold for cash
Cotton seed	10.3	4,638.5 lb.	4,221
Corn	16.5	255.8 bu.	19,533
Oats	1.8	43.6 bu.	1,898
Wheat	2.3	29.2 bu.	2,341
Hay	5.1	5.0 tons	5,000
Pasture	5.0	3.5 tons	3,500
Timber and idle	50.0	------	------
Total	91.0		36,493

Obviously, a number of other important crops, such as peanuts, tobacco, sweetpotatoes, soybeans, etc., will continue to be grown on many farms in the South. The land acreage occupied by these crops would be deducted from that shown in the table as cropped to cotton and corn.

The changes in crop acreages together with the production to be expected under conservation farming are tabulated below. Production increases as calculated assume increases of from 25 to 50 percent as indicated above.

Crop	*Acres*	*Weight or quantity*	*Digestible nutrients, lbs.*
Cotton lint	------	3,420.0 lbs.	Sold for cash
Cotton seed	9. 5	6,088.0 lbs.	5, 540
Corn	17. 5	379.8 bu.	29, 071
Oats	5. 0	151.5 bu.	6, 601
Wheat	8. 0	127.2 bu.	10, 193
Hay	13. 0	19.1 tons	19, 110
Pasture	15. 0	15.4 tons	15, 440
Timber and idle	23. 0	------	------
Total	91. 0		85, 955

The data presented show that under the conservation system of farming the pasture acreage would be increased from 5 acres to 15 acres, and the acreage of rotated cropland would be increased from 36 acres to 53 acres. The acreage of clean-tilled crops remains practically unchanged, but acreages of hay, small grain, and pasture would be increased by utilizing idle and sparsely wooded acreas. This makes possible the very necessary practice of crop rotation and enables the farmer to keep more livestock, thereby increasing his cash income. Many farmers will elect to reduce their cotton and corn acreages and grow some peanuts, tobacco, soybeans, potatoes, etc., and thus make a larger contribution to the wartime food-production program.

Under the conservation system of farming, 49,462 pounds more of digestible nutrients would be produced than under the old plan of farming. This represents an increase of 135.5 percent, which if fed to livestock would allow the farmer to keep added livestock amounting to three calves, five milk cows and three heifers, and to produce twelve 250-pound hogs.

If but half the farmers in these eight cotton States would practice conservation farming to the extent indicated, the increased production of crops over those produced in 1940 would feed for 1 year 4,258,765 cows, 2,555,259 calves, and 2,555,259 yearling heifers. In addition, 10,229,000 hogs weighing 250 pounds each could be raised.

From the analysis given of these two important agricultural areas, it is quite obvious that farmers do have both the opportunity and the responsibility in producing those crops and products that are so critically needed for winning the war. Similar results can be expected in other sections of the United States if needed adjustments in cropping and cultural operations are made.

Soil conservation districts have been organized in 42 States and are receiving Federal and State assistance in their planning and operations work. These districts are facilitating the application of factual conservation information to the land. They are in position to make effective use of those conservation practices that ensure immediate and continued increased production and thus help to meet the farm production goals needed to carry out our food for freedom program.

With the world almost completely embroiled in war, our soil has become a bulwark necessary to our existence more than ever before. While good land is always important, in time of war it is as essential as good guns and ammunition. This country has the land and resources to produce the food that will be needed to win this war and the peace that follows. Farmers who practice conservation farming, which after all is efficient farming, will make a major contribution toward winning the war.

Mixed pasture keeps hogs healthy, increases weights, lowers production costs.

Constant, intelligent control over water reduces erosion losses, cuts down expense, increases crop yields.

PRODUCTION REPORTS FROM IRRIGATED LANDS

BY FRANK KIMBALL[1]

CONSERVATION irrigation practices accounted for much of the vast tonnage of food and fiber products grown in the Western States during 1942, and will undoubtedly occupy an increasingly important place in western crop history of the future.

In planning for the necessary increases in agricultural production to meet wartime demands it is logical that irrigated areas should receive special attention because crops grown under irrigation are not greatly affected by climatic influences, production rates per acre are high, and the increases can be obtained in relatively short intervals of time. Many irrigated areas could materially increase their crop yields through the use of more efficient irrigation practices; in some instances increases of one-third could reasonably be expected.

Extension of existing irrigated areas and development of new irrigation projects is definitely limited by the availability of water supplies, and this factor serves to emphasize the necessity for exercising proper control over irrigation water. This includes management and control of watershed areas and streams, as well as the structural works necessary to get the water to farms. Most important of all, it means control of water during its application to crops. It is also necessary to understand that generally irrigation problems are of a group or community nature, and that of the thousands of existing irrigation enterprises, each is more or less peculiar to the lands which it serves. Entire communities are built around the irrigated areas and the tax base in many agricultural communities is dependent mainly upon the values of irrigated lands and irrigation systems. *The livestock industry in the West receives about one-half of its feed supplies from irrigated lands.*

Soil Conservation Service technicians find that the problems confronting them in irrigated areas generally can be classified in one of the following categories:

1. Land in need of conditioning and improved irrigation and farming practices.
2. Improvement or construction of farm distribution systems.
3. Improvement or construction of water supply systems serving single farms, or groups of farms.

The main purpose of assisting farmers and irrigation enterprises in solving these problems is to enable irrigators to apply water to crops at the right times and in the right amounts to help ensure the permanency of profitable crop production.

Since irrigation problems are largely of a group or community nature, they are solved most effectively and efficiently when the group or community has a mutual understanding of such problems and when the people work together with a clear knowledge of the facts and objectives. At the present time there are approximately *1,000,000 acres of irrigated lands in soil-conservation districts in the 17 Western States.* Many irrigation enterprises are finding that this type of organization is admirably suited to assist them in solving their group and individual problems.

The following examples, taken from field reports of the Portland, Oreg., and Albuquerque, N. Mex., regional offices, are presented below to indicate the kinds of assistance the Soil Conservation Service has given to hundreds of individual farmers and

[1] Head, Irrigation Section, Engineering Division, Soil Conservation Service, Washington, D. C.

irrigation organizations in these Western States:

1. An orchardist near Yakima, Wash., was having severe erosion, with declining production, on his cherry and apple orchards as a result of irrigating steep clean-cultivated slopes. Technical assistance enabled him to develop an excellent cover crop and mulching program and to use sprinklers operated by a booster pump from the irrigation canal. Since installation of these practices, yields have increased from 10 to 25 percent and the quality of fruit is approximately 50 percent better. Water is being conserved and erosion is being controlled. This orchardist has learned that conservation on irrigated lands pays dividends.

2. A farmer living 3 miles northeast of Ellensburg, Wash., had been irrigating a 40-acre alfalfa field with wide-spaced furrows approximately 1,200 feet long. The lower 10 acres of the field were waterlogged from excessive surface and subsurface irrigation water. With assistance of Soil Conservation Service engineers, the farmer installed three additional head ditches, reducing the run to approximately 330 feet. An interception drain was installed above the waterlogged area. The 10-acre field was dried up and is now producing good crops, and the entire field is now being irrigated with less work and less water than formerly. The cost to the farmer was approximately $200 and increased production is not less than $300 annually.

3. A dairy farmer in Spokane County, Wash., was finding operations on a 160-acre dryland farm financially difficult. A small creek could furnish 150 gallons of water per minute to the farm. With the assistance of Soil Conservation Service technicians, a sprinkler irrigation system was installed to irrigate 40 acres. The farmer increased his dairy herd from 12 to 20 cows, increased butterfat production per cow, produced all hay and silage needed, and produced cash crops in a dual type of enterprise. The cost to the farmer was $1,500. The annual returns from the farm were increased from $1,200 to $2,000 per year.

4. A beet producer in southeastern Idaho was finding it difficult to irrigate his hundred acres of beets with the available water, using 1,200-foot runs. With engineering assistance supplied through the Oneida Soil Conservation District, the runs were shortened to 400 feet. As a result, one less irrigator was required. Due to more even water distribution the best yield was increased from 12 to 17 tons per acre. In this instance conservation didn't cost—it paid!

5. An irrigation district in southern Idaho was faced last year with a water shortage because the pumping plant was inefficient. Plans and specifications were prepared by Soil Conservation Service engineers for improving the wells, procuring new pumps, and lining a leaky canal. Further assistance was extended in securing a priority rating so that the equipment could be purchased. As a result of this improvement, and at a cost of only slightly over $6 per acre, nearly 1,700 acres of land now have a dependable and efficient irrigation system.

6. Near Walnut Creek, Calif., several farmers irrigate walnut orchards from wells. The ground water table had been declining until the irrigation systems were jeopardized and pumping costs excessive. By placing some stop-log check dams in an intermittent stream, the ground water supply has been replenished and pumping costs reduced. The cost was insignificant as compared to the benefits derived.

7. Contour planted potatoes in a demonstration on the Kittitas project in Washington showed decreased water use, improved quality of potatoes, and reduced soil erosion, when compared with down-hill plantings on land with slopes of 5 percent to 8 percent.

8. Anticipating a shortage of water during the irigation season of 1942, Lloyd Taylor of Red Mesa, Colo., a farmer, requested assistance last spring from the Soil Conservation Service in rehabilitating his irrigation system. SCS technicians located lines for laterals on 301 acres, shortening runs and arranging for the "pickup" and reuse of what ordinarily would be waste water.

Results of this work are apparent in Mr. Taylor's statement after harvest of this year's crop. "Due to more efficient use of my limited supply of water, I was able to grow a full crop on the whole 301 acres, whereas under the old system of irrigation only 150 acres could have been watered, and I would have had a complete failure on half of this acreage."

The result is 4,500 bushels of small grain saved for national war needs by application of conservation practices.

9. In the Safford Valley of Arizona, farmers have found the dollars-and-cents benefit of improved irrigation practices. On the Charles F. Watson farm, terraces and concrete drops on irrigated fields are credited by the farmer with having doubled his production.

On M. J. Ferguson's farm, terraces and concrete drops for surplus water disposal have enabled him to irrigate with one-third less water, have increased production by about one-third, and cut his irrigation labor in half. In addition to his increased income and more efficient operation, the improved irrigation system has helped check serious soil washing that already had destroyed about 50 acres.

10. The Whitewater community in Mesa County, western Colorado, is finding that revamping of its irrigation system is putting the farms of the vicinity on the road to new stability and better operation.

The community is served by one of the oldest irrigation ditches in Mesa County—a ditch that was built in 1882. Over the years a number of problems have developed which mounted up to more of a burden than local residents could cope with. The diversion dam intake and headgates were a constant source of trouble. Floods frequently took out the brush and rock diversion structures and debris lodged in headgate structures to cause loss of water until repairs or cleaning operations could be completed. Division of water was a source of difficulty, and application of water presented a variety of problems.

When the local people formed the Kannah Creek Soil Conservation District, one of the first jobs tackled was that of working over their irrigation set-up. Soil Conservation Service technicians recommended a new concrete diversion dam, headgate and division box. The application of irrigation water to the farm lands still remained the big problem, however, and after considerable study, the district and SCS hit on a system they believe will be the solution to the irrigation problems of the community. Although the border method had never been tried there, it was believed that it would prove advantageous.

A farmer, whose best piece of land was so flat he had not attempted to farm it for 14 years, agreed to try the new system. Eight acres of land were prepared and bordered, and the first application of water proved successful. It indicated at least two important advantages of the border system over the old corrugation type of irrigating in that area: The border system requires only one-half the time to irrigate the same amount of land, and there is no water wasted. Now, with interest aroused, the soil-conservation district is advocating that all farmers in the Whitewater community adopt this border method, even though it involves a radical change in present irrigation practices.

In the past, in this community all farmers had varying heads of water with which to work, ranging from 2 to 67 miner's inches of water. For the border method, it is being recommended that they all pool their water and rotate the use of it. This in itself will eliminate many of the inconveniences of the corrugation method in which it is common practice to receive a definite amount of water—say 57 inches—and use that amount day and night the entire irrigation season. Irrigation "sets," under the old system, are made at 8 o'clock at night and not changed until 6 o'clock the next morning. This usually results in over-irrigation and water waste.

Under the border method, a large irrigation head is applied at one time, which may require a 48-hour irrigation period. But when the next person takes the water, the first farmer is relieved of irrigating until his turn comes around again—say 2 or 3 weeks later.

The border method is an innovation in the Whitewater community, but if it works out as well as it appears to have started, it should prove to be a great benefit to the area in terms of more efficient irrigation and improved crops and yields.

11. After 26 years of uncertain farming and gardening without irrigation water, the residents of Cabezon, N. Mex., are happy over their achievement in getting water for their lands this spring.

Wishing to cooperate with the Government in its Food for Victory program, Cabezon residents, early in 1942, under the leadership of B. P. Hovey, secured permission to use the excess water of the San Luis community ditch, which had been rehabilitated as a Water Facilities project in 1941. They also arranged with the State Engineer for the declaration of their water rights.

An agreement was drawn up and signed which provided for the Soil Conservation Service to furnish engineers for surveying, designing, and supervision of reconstruction for the 7½ miles of ditch and a 125-foot flume across the Balcon Arroyo. The Soil Conservation Service also loaned the community a caterpillar tractor and a 10-foot grader which in 20 days constructed the ditch and a number of the distribution laterals. The Farm Security Administration loaned farmers the money to pay the tractor operator. Through the Grazing Service and the Sandoval County Commissioners they were able to secure funds for the purchase of fuel oil for the tractor and to do their trucking. They purchased an old railroad bridge which provided piling and heavy timbers for construction of the flume and necessary road bridges. The New Mexico Timber Co. donated the lumber, nails, and roofing paper for the flume. The Bernalillo Mercantile Co. donated the cement needed.

All those who expected to make use of the water contributed their time, teams, and such equipment as they had, and by working early and late the system was completed and the water turned into the ditch on May 10. When the water arrived at Cabezon there was great rejoicing. It is reported that some of the women wept for joy and the older men reported a funny feeling in their stomachs!

The cooperative spirit shown by the thirty or more families in rehabilitating the irrigation system

Irrigated pastures are a factor in the accelerating drive for food.

Water has played an important part in the winning of the West. Now it is destined to play an important part in the winning of a war.

destroyed 26 years ago by erosion in the Rio Puerco watershed, which will provide water for approximately 600 acres of valley land, is an outstanding example of "democracy" at work.

12. Rehabilitation of 20 ditch systems in the vicinity of Trinidad, Colo., recently has saved the production of about 30,000 acres of irrigated land.

In April 1942 a flood on the Purgatoire River washed out all diversions serving this farming area, valuable, among other reasons, for its sugar-beet crop. If this crop were to survive, irrigation facilities had to be reestablished within 3 weeks.

Emergency assistance in replacing the irrigation diversions and headings was given by the Soil Conservation Service, Forest Service, and Bureau of Agricultural Economics. Water was in the ditches in time to save the sugar beet crop.

From the foregoing examples it is readily seen that the degree of success obtained in interesting irrigation farmers in adopting sound water-use and agronomic practices quite often depends upon the repair or construction of the physical works necessary for the operation of their irrigation enterprises. The demands for such improvements will be governed mainly by the financial status of the enterprise, value of irrigation water, and the kind of crops grown.

(*Continued on page 188*)

Good pastures and good cattle mean more food with which to wage successful war. W. R. Cutrer and J. B. Cutrer, father and son members of the Bogue Chitto-Pearl River Soil Conservation District, saw milk production climb from an average of 275 pounds per day to more than 600 pounds when their 30 cows were turned in on clover-Dallis grass pasture last spring. After 40 days the cows were taken from the pasture so that the clover seed might be harvested. Later they were returned to the pasture to graze Dallis grass.

WAR-NEEDED PASTURES REPLACE KING COTTON

BY CHARLES G. WEBB[1]

PART of the pattern for a New South is in the making in the Florida parishes of Louisiana, and the dominant design is grassland agriculture. One-cash-crop farming that has ruined so many southern farms is going out of the picture.

Soil-conservation districts are pointing the way toward this new agriculture with limestone, superphosphate, and muriate of potash, and with hop, white and Persian clovers, and Dallis grass. Under guidance provided by the districts, farmers are spending $15 to $25 per acre to build soil-holding, soil-improving, milk- and meat-producing pastures. They report that the entire cost is returned to them within grazing periods of 3 weeks to 6 months by increased milk production and reduced feed bills. Bank President J. M. Breeden of Greensburg, La., believes fine pastures are such good investments for farmers and his community that he is urging other landowners to place more land in clovers and grasses.

Poor land at first, and now good land, is being converted into pastures as farmers turn their backs on the old style one-cash-crop farming system. Some land that had been in cultivation a hundred years or more—land that had seen the rise of King Cotton and had grown thin and weary under his tyranny—is now carpeted with a mixture of palatable, nutritive forage plants from 8 to 10 months each year.

This change from cotton-and-corn agriculture to diversified farming through scientific soil-conservation methods is completely in harmony with our wartime food-production program. Milk and meat are high on the "must" list of foods necessary to keep us working and fighting.

W. E. Dee is the agronomist whose recommendations were followed in developing these high-producing pastures. Bill Dee is a district conserva-

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tionist of the Soil Conservation Service assigned to the Bogue Chitto-Pearl River and Feliciana Soil Conservation Districts. Good pastures are Dee's pride and joy—pastures that hold soil, pastures that produce milk needed in the war effort and put a jingle, jangle, jingle in farmers' overalls. These two districts cover all or parts of Washington, St. Tammany, Tangipahoa, St. Helena, East and West Feliciana, and East Baton Rouge Parishes, the so-called Florida parishes of Louisiana.

The entire treatment of the land before clovers and Dallis grass are planted, and the use afterwards, is shaped to supply the needs of the legumes and grasses to be grown. In nearly every instance, soils are tested in the soils laboratory at Louisiana State University to determine what plant nutrients are limited or lacking, and what quantities of fertilizers should be applied to make available the necessary plant foods and to provide a favorable environment. More humus usually is required, and one of the first steps in the pasture development is to plow under a green-manure crop, preferably a legume; or to plow under crop residues; or to add animal manures—or to use a combination of these methods of adding organic matter to the soil. Both cowpeas and crotalaria have been plowed under as green-manure crops.

Treatment used on the D. H. Gill farm in Tangipahoa Parish is typical of the methods followed in establishing clover-Dallis grass pastures. Following the harvest of oats in the spring of 1941, the field was disked and planted to a mixture of 10 pounds of *Crotalaria spectabilis*, scarified, and 1 bushel of cowpeas per acre. These legumes were plowed under green in September, and 1½ tons of dolomitic limestone was applied per acre. After a rain fell, 200 pounds of 48-percent superphosphate per acre was harrowed in. During the first week of November, a mixture of 10 pounds of hop, white, and Persian clovers in equal parts by weight and 10 pounds of Dallis grass per acre was sown. Later a top-dressing of 100 pounds of 50-percent muriate of potash per acre was applied.

White and Persian clovers usually come into grazing at about the same time, and the hop clover comes in last. Toward the end of the grazing season, hop clover generally matures and dies first, Persian next, and white clover last. White clover usually lasts 4 to 6 weeks longer than hop clover, and 2 to 4 weeks longer than the Persian. One of the advantages of hop clover is that it gives more and better grazing than either of the other clovers on sites where fertility and organic matter are low.

Dee said he has observed that this combination of clovers has a tendency to reduce bloating of cattle, as compared with stands of pure white clover. However, he warned that the combination "is not a cure-all for bloat."

Dallis grass begins to appear when the sun reaches the soil through gaps made in the stand by the death of hop clover plants. As more and more clover plants die, more and more Dallis grass comes up to provide summer grazing.

First year seeding of hop, white, and Persian clovers usually provides grazing from March 1 to June 1. After the first year, these clovers usually may be grazed from January until May 15 or June 1. Some of the second-year pastures in the Bogue Chitto-Pearl River Soil Conservation District were being grazed November 24, 1942; some were expected to be ready for grazing by December 15, but others were not to have cattle on them until January 1.

In order to permit the clovers to reseed, cattle must be taken from these pastures when the clovers are in full bloom, usually from May 15 to June 15. As a means of providing necessary grazing during this seeding period, supplemental pastures of lespedeza and Dallis grass are planted in February or March. Alyce clover (*Alysicarpus vaginalis*) performed so well in 1942 that it will be used in several plantings next spring in lieu of lespedeza. Alyce clover makes most of its growth during late summer and fall months.

Dee frequently refers to the clover-Dallis grass pasture as No. 1 pasture, and to the supplemental pasture as No. 2 pasture. He recommends that an equal amount of each type of pasture be established on each farm. From experience he has learned that 1 acre of the clovers will carry as many animals from January to June 1 as two acres of lespedeza and Dallis grass will carry during the summer and early fall months.

Some of the advantages of having two types of pasture, in Dee's words, are these: "By having the No. 2 pasture, the No. 1 pasture is permitted to make a good crop of clover seed. The Dallis grass is permitted to get a good start in the No. 1 pasture, and after the No. 2 pasture is grazed down, the cattle are put back in the No. 1 pasture. Cattle then are alternated between pastures until the time of gleaning cultivated row crops in the fall."

Any grazing chart or schedule would be subject to the variables of weather, soil types, soil fertility, and organic-matter content of the soil. However, an approximation of the use to be made of these pastures and gleanings from cultivated row crops would be: January to June 1, pasture No. 1; June, pasture No. 2; July, August, September, and part of October, both pastures; remainder of

October, November, and December, gleanings from cultivated crops.

Much of the land now going into pasture lost between 25 and 75 percent of the topsoil while in cultivation, and some of it even more than 75 percent. Well-managed good pastures control erosion and help build new topsoil.

Farmers probably have reasoned that if good pastures can be built on the poorer land, even better pastures can be made on the best land. Thus on many farms good land is going into pasture. Charles Schwartz of Kentwood is putting to pasture 5 acres of land that have produced as many as 8 bales of cotton. H. A. Kennedy of Angie has 34 acres from which he has harvested as many as 40 bales of cotton in one fall, but he is putting 10 acres of this land in clovers and Dallis grass.

This change from the old cotton-and-corn agriculture is being made in the face of the best prices in years for cotton and corn. On the other hand, milk, and beef prices are good, and both are vitally needed wartime foods. And the pastures require less labor.

Dee reported that 172 farmers in the two soil-conservation districts established clover and Dallis grass pastures in the fall of 1941 on approximately 1,700 acres.

One of these farms is operated by M. S. Daugherty and his son, M. S. Daugherty Jr., near Lindsey in the Feliciana Soil Conservation District. Before planting a 30-acre pasture, the Daughertys distributed 100 pounds of 48-percent superphosphate, 75 pounds of 50-percent muriate of potash and approximately 1 ton of lime per acre. When the Daugherty herd of 55 cows was placed in the pasture last spring, milk production rose from an average of 110 to 130 gallons per day. In order to obtain a seed crop, the cows were taken out of the clover pasture after 25 days of grazing. The Daughertys, who were receiving 14 cents per quart for milk, estimated that the clover pasture increased their gross income $11.20 daily during the 25 days of grazing. Two-thirds of the clover-seed crop was lost because of rain, but the one-third successfully harvested from the 30 acres was sold for $1,000.

Willie Crow, in Washington Parish, planted 3 acres to clover and Dallis grass in 1941 at a cost of $45.75 for seed and fertilizer and $8 for labor, or a total of $53.75. The entire cost was repaid during the first 3 weeks of grazing after 16 cows were placed on the pasture March 25, 1942. Milk production rose 75 pounds per day, and the feed costs were reduced materially.

Lee Ezell, operator of a 55-acre dairy farm at Franklinton, retired 10 acres of cultivated land to clover-Dallis grass pasture at a cost of $18.20 per acre in the fall of 1941. In terms of reduced feed bills and increased milk production from 20 cows, the pasture was worth $35 an acre during the first 50 days of grazing last spring.

After visiting several of these "made" pastures in Tangipahoa Parish, Banker Breeden of Greensburg sent letters to his farmer-customers calling their attention to this phase of the soil-conservation district program. He wrote as follows:

"The total cost ranges between $15 and $25 per acre, or an average of about $20 per acre, depending upon the type of soil, but it is my opinion that if the advice of the county agent, the AAA parish administrative officer, Soil Conservation Service workers, and other agricultural agencies is followed closely, you will be more than pleased with the results. It may seem strange to you to get a letter of this kind from a banker, but we realize that the bank can prosper only when our customers and the entire community are prosperous."

So much enthusiasm has been aroused for these good pastures that many additional farmers were establishing clover and Dallis grass pastures in the fall of 1942. Dee estimated that approximately 4,000 acres were going to pasture. At least 112 district cooperators were establishing improved pastures for the first time. In the Bogue Chitto-Pearl River District alone, district cooperators ordered 25,000 pounds of a mixture of white, Persian, and hop clover seed, and 25,000 pounds of Dallis grass seed.

PRODUCTION REPORTS FROM IRRIGATED LANDS

(*Continued from page 185*)

During the present war emergency all construction activities involving the use of scarce materials must necessarily be limited to works of very high priorities. Meanwhile, temporary types of irrigation structures made with local supplies of rock, earth, logs, and like materials may afford very satisfactory substitutes for permanent works. In general, the needs for structural work might be materially reduced on most irrigation enterprises by improving or intensifying regular maintenance activities, and the widespread adoption of more efficient and economic uses of water. The present shortage of farm labor and of equipment replacements also serves to emphasize the needs for careful farm planning whereby the way is cleared to increased production through conservation farming.

BOOK REVIEWS AND ABSTRACTS

by Phoebe O'Neall Faris

CONSERVATION OF NATURAL RESOURCES. By George T. Renner. New York and London. 1942.

Without people who look far into the future of our country we would have no great conservation movement today. Because it will be the same in another generation, and another and another, education of the youth of the present in ways to use and at the same time preserve our resources is our most important problem. It is disconcerting, to say the least, to talk with a man who for several years has taught a rural school of some 75 farm children and to discover that he never heard of the Soil Conservation Service or a soil-conservation district, and thought soil conservation meant taking the land out of cultivation and getting paid for it.

Such a talk I had a few month ago, with such a teacher; and since that time I have been looking for books especially suited for use by teachers and pupils who need to "catch up" with the idea of conservation as well as the immense conservation program now working as a part of our general social and economic system. This book is such a book, in my opinion, chiefly because it is not written and compiled from the viewpoint—or vantage point—of any Government administration or agency, any group of officials, or any publicity scheme. It is a teacher's text, by a teacher—a teacher getting down to the business of organizing conservation subject-matter so that it can be presented to the pupils of all schools as a basic theme of all subjects in any way related to our natural resources. The author is professor of geography of the Teachers College of Columbia University, and consultant to the United States National Resources Planning Board.

As Professor Renner states, "A new human geography is in the offing; new economic, social, and civic viewpoints must be brought to the American people. The possibility of conserving their national heritage of resources must be taught to every man, woman, and child in the country." As the war is teaching us more rapidly than we could have imagined only 3 years ago, this is gospel truth—it is truly amazing that it has taken us so long and so tragic a road to recognize it. The first three chapters of Professor Renner's new book for teachers shows quite clearly why the evolution of conservation thinking has been so slow a process in our country, and why it is that now an active conservation program demands the attention of all citizens and of our entire public school system in particular.

An excellent conservational classification of resources is presented, in outline form, in chapters 6 to 8 inclusive. Six classes of resources, with a remedial program for handling each, are given simple treatment that should start any grammar school pupil to thinking and lead young minds onward toward an understanding of personal responsibility in public affairs. One cannot but feel that Professor Renner, in planning his book for teachers, had some hope that the teacher might put this part of the volume directly into the hands of the pupils.

The Teacher's Forum, at the end of each chapter, is brilliantly planned and arranged to accomplish the end in view—to guide the teacher and the student to an understanding of the fact that the Nation cannot continue to be great and powerful and free if it continues to destroy the bases of its future existence by wasting its resources, including its people. It is not going to be easy to get school children to think of themselves as one of the Nation's resources. They must be shown that upon the quality of their mentality depend not only their own lives and happiness as individuals, but the greatness and safety of the country as well.

This new book will go a long way toward supplying teachers of city and rural schools with a manual for teaching conservation. Each of the 9 chapters of part II provides an outline of a course in conservation of one of the natural resources. Soil, water, minerals, forests, range grassland, wildlife, recreational resources, and human resources are all treated separately as to their origin or nature, the conservational problems concerning them, and remedial measures including many that will appeal to the pupil as his own personal part in a permanent conservation program. The chapter on conservation planning, at the end of part II, is especially important because it points out very clearly the reasons for community planning to supplement national planning if we are to safeguard the future of our democracy.

Part III is for the teacher and the student-teacher in training. Its four chapters are devoted entirely to the curriculum, methods for organizing a course of study in conservation, and the local materials, both rural and urban, for initiating the course and carrying it through in such a way that it will become a permanent part of the teaching philosophy and the school as an organized institution for the safety of our Nation.

All chapters include teacher's bibliographies listing outstanding publications available to teachers. In addition, a section of the chapter on general materials for conservation education is given over to textbooks, student and teacher reference material, visual materials including maps, graphs and films, and agencies within the United States whose principal concern is conservation of national resources.

SAGA OF THE CCC. By John D. Guthrie. Drawings by Marshall Davis. American Forestry Association, Washington, D. C. 1942.

A theme-song, "All Over America," sings across the pages of this Saga. It is a souvenir book, in blank verse, by a man who knew CCC boys—all over America—from the beginning in 1933. The artist who made the drawings was himself once a CCC enrollee, and he has "caught" the boys at work in America's fields and forests, under their tents, dreaming their dreams, learning to be good farmers, good technicians, good soldiers.

Major Guthrie's verse is good; it flows along happily, then becomes vivid and dramatic, ends with "taps" for "Uncle Bob" Fechner, Director of the Corps for 6 years.

We of the Soil Conservation Service have happy and grateful memories of the CCC, and this little book will serve as a keepsake, to be taken up and read and reread

BOOK REVIEWS AND ABSTRACTS

by Phoebe O'Neall Faris

so that we shall not forget the boys of the Corps who "put in millions of hours in conservation," threw up earth dams for us, set young locust trees for us, filled and levelled gullies for us, helped us get going with soil conservation "All over America." They are now soldiers, these boys, fighting for our country.

ECONOMICS OF SOIL CONSERVATION. By Arthur C. Bunce. The Iowa State College Press, Ames, Iowa. 1942.

This new study of the economic aspect of soil conservation will start many an argument—and no doubt it will serve to end some arguments already nearing the rebuttal stage. It has been said that when a definitely moral or ethical movement reaches the point of being a subject for debate as to its economic repercussions, then and then only does it become a permanent part of our national life.

The soil-conservation movement in the United States sailed right into the field of economics some time ago and now rides the waves of our wartime production policy with flags flying. Dr. Bunce, author of this new volume, has had no small part in carrying through some extremely important studies to determine the economic effects of planned conservation on the individual farm and farmer in Middle Western areas. His book is an analysis of factors that must be considered in deciding whether or not it is economic, from the point of view of both the individual and of society, to expend labor and capital and planning effort to build up or improve or reclaim land that has reached a state of deterioration through exploitive farming methods.

What these factors are, and how they should be assembled and measured, constitutes the thesis of the book which, by the way, is dedicated to the Chief of the Soil Conservation Service. Price and land-value fluctuations; social upheavals resulting from severe soil losses; agricultural, industrial, and even trade changes as related to used-up virgin fertility of soil; changing labor costs; national or local emergencies affecting social welfare—these are a few of the broader aspects which are discussed and pointed out as exceedingly important in forming a national land preservation policy that will serve to meet widely fluctuating needs over long periods of time.

A somewhat different set of factors must be considered, according to Dr. Bunce, in the matter of conservation plans for individual farms. These factors depend greatly on whether the farm land is eroded so that it needs repair measures or shows only fertility depletion to such an extent that its productive capacity is lowered. They are concerned chiefly with the individual's ability to weather the period of adjustment to the conservation plan. In the chapter, Society and Conservation, the author balances the two sets of factors as an approach to the problem of social control over land use, through education, demonstration projects, prices, subsidies, property rights, taxation, public ownership, police power, and zoning.

In the last three chapters of the book, Dr. Bunce assembles his factors, both tangible and intangible, and coordinates them into lists of "estimates necessary to determine whether conservation is economic." The chapter entitled Problems of Measurement in Conservation Planning is one that will stop and start arguments, but undoubtedly it should be read by all who now realize that, as Dr. Bunce expresses it, "We have now reached a transition period in our economic and social development." The final two chapters of the volume are on war and conservation, emergency conservation planning in the war production program and a post-war adjustment period, and formulation of public policy to ensure us a flexible and sound soil conservation program as a safeguard to our agriculture.

AGRICULTURE IN THE PHILIPPINES

Cultivation is hazardous in the Philippines because slopes are steep, rainfall is heavy, and soils are highly erodible. The short rivers with steep gradients carry heavy loads of material eroded from intensively cultivated slopes.

On Negros and Luzon cultivation of sugarcane has been rapidly depleting the soils. In the interior of Cebu, soils have been eroded beyond reclamation. But cultivation can be carried on in the Islands under proper management. In Davao, abacá is cultivated on thousands of acres protected against erosion, and on one rubber plantation in Mindanao soil-conservation methods have been practiced for a decade.

Good management and mismanagement of land is illustrated on the cultivated grassland areas in the Bukidnon region of Mindanao. Large quantities of first-class pineapples are produced on this soil in fields cultivated across the slope, provided with cross-slope ditches for removal of excess rainfall, and protected by green manure crops after the pineapples have been taken off. The productivity of the same soil cultivated with a light-weight plow and put in corn or rice repeatedly, two or more crops each year, is rapidly declining.

It is reported that Japan plans to devote a million acres of land in the Philippines to cotton. Before the invader came, the story told by good and poor land management was written on the face of the land.—Adapted from Geographical Review.

Selection of right pasture mixtures and controlled irrigation and management have turned a 20-acre field which was too wet for crops into a profitable part of his farm, William Boyd, farmer in the Pavillion soil conservation district near Riverton, Wyoming, reported recently.

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Compiled by ETTA G. ROGERS, Publications Unit

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THE LAND AND ITS BOUNTY

A full basket—health for fighters—comes of healthy land.

No happenstance can deal with the hunger of the United Nations. No farming by chance can build sure victory.

Land-ripping is thoughtless and expensive and inadequate.

Behind the harvest must go all the skill and intelligence of American husbandry at its topmost best. Behind the smile of achievement must go the sweat and toil of an enlightened, determined people. Farm planning—properly disciplined and directed soils—is the only certain route to goals.

Here in this picture of an attractive, well-nourished farm lassie holding an exhibit of mineral-rich, vitamin-strong vegetables against a background of orderly, strip-cropped acres is the whole portrait-in-miniature of the conservation-production idea.

Major task before the Nation's agriculture is the country-wide enlargement of this miniature. The job is to reach every farm with the urgency of contouring, of grassed waterways, of strip-cropping, of terracing, of using the land in harmony with Nature's own scheme. Do these things in 1943, and a harvest such as this country has never seen before will fill the warehouses and load the ships and reach democracy's millions in quantities that will constitute a guarantee of triumph.

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